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Fire protection measures in the Central Provinces.

I do not propose, in this article, to discuss the merits and demerits of fire protection in rigid form, or early burning, or the effect of fire protection on the existing forests. I only intend giving a summary of the fire-protection rules recently issued for the guidance of the District Forest officers of this province, some of the rules marking a change in the system in vogue formerly.

The present forests in each division are divided into three classes to facilitate the introduction of effective fire-protection measures:

(1) First class forests, or, specially protected forests,

(2) Second class forests, or generally protected forests,

(3) Third class forests, or forests protected by law only.

(1) *The first class forests include:*

(a) Regeneration coupes under uniform system.

(b) Young regenerated woods including coppice coupes whilst closed to grazing.

(c) Plantations.

(d) Other areas ordered by the Conservator for special reasons (such as grass areas and areas of intense lac cultivation.)

These areas are supposed to be rigidly fire-protected, and are to be isolated, by means of fire-lines, from the rest of the areas. The fire lines shall be cut and burnt as usual and patrolled by fire-watches. Any fire occuring in these areas shall be at once reported, that is, the regular proceedure in case of a fire-occurrence shall be followed.

(2) ***Second class forests***: These include all the forests under systematic working, and certain areas specified by the Conservator. These areas shall be isolated by exterior fire lines, and also shall be divided into convenient blocks by interior fire lines. The cutting of guide lines is unnecessary in such areas. As soon as the grass becomes combustible, all fire lines, roads, paths, ridges, etc shall be burnt in successive stages as the grass dries up. The fire is allowed to burn itself out. Early burning can also be sanctioned by the Conservator as a supplementary measure.

(3) ***Third class forests***: These are forests protected by law only, and include areas that do not come under the first or second class. The deliberate burning of fire is prohibitied in such areas, but no other step of fire protection is taken here.

After a clear description of such a classification of the forests, fire-lines, and duties of subordinates, the responsibility of the officers in carrying out the measures which leave no loop-hole, is given in unmistakeable terms.

As mentioned above, specially protected forests shall be isolated by exterior fire lines. The width of the fire lines varies according to the locality, and is generally between 40 to 100 ft. Two-guide lines shall be cut on both sides of the fire-line by the end of November. The width of the guide line willl vary with the height of the grass existing on the fire line. The guide line shall be cleared by the end of December. In case any of the second or third class forests are contiguous with such fire-line only one guide line shall be cut on the side of the first class forest, and while burning the line the fire shall be allowed to run towards the second or third class forests.

In generally protected forests as already mentioned, no guide line shall be cut, and the fire will be allowed to burn itself out. It is important that the operation should be conducted when the grass is sufficiently dry so as to allow a sufficient burnt area to intervene such forest and other areas. It should be finished on the date fixed by the District Forest Officer himself and any fire occuring in such areas after that date shall be reported similarly as fire occurrence reports.

For proper control of the progress of the work monthly reports shall be submitted by the Range Officer to the District Forest Officer and by the latter to the Conservator. The regular fire maps shall also be maintained as usual.

Lastly it is important to note that the subordinates in the vicinity of second class and third class forest cannot turn their backs to the occurrence of fire in such areas, but on the other hand no stone shall be left unturned to put out fire in any class of forests occuring after the date fixed for the completion of burning operations and the subordinates are not only to look to their own charge but shall at once proceed towards the rising smoke in the Government forest under anybody's charge until relieved by the proper man and if no more help is required.

As far as I can make out, these rules are amendments to the original code. I had the pleasure to read these rules a fortnight back, when my Range officer was explaining them in vernacular to one of the Range assistants. Of course it is presumptuous on my part to criticise them. The rules stand on their own merit, and it is hoped that the forests of Central Provinces have a brighter future. They tend to enconomise expenditure on fire-protection, and the fire-protection will be afforded with greater satisfaction and better results.

H. P. Verma,
Forest Ranger, Central Provinces,
7—3—1927.

Mechanical, versus, Animal, Traction.

There was a time when animals, or animal driven vehicles were the only, and the fastest means of transport. With the advent of a scientific era almost every thing has undergone a change, but the changes brought about by the improvement of the means of communi-

cation have much to do towards the onward progress of civilization. The invention of steam engine, and its subsequent application in the form of railways, has placed at the disposal of man, comforts and safety that were unthinkable in the so called good old days. The railways did much towards the diffusion and increase of international trade and bringing the people of different cultures close together. This is the first victory won by the mechanical over the animal force.

The restless human mind was not satisfied with the introduction of railways, and steam-ships, but sought after much faster means of transport. Time and space are the two greatest enemies of the swift means of communication, but the human mind is determined to surmount all difficulties. The continuous endeavour led to the invention of oil, gas and petrol engines which are at present used as a source of power to drive the motor cars on the surface of earth and the air ships in the upper air. As science advanced it revealed many a jealously guarded secrets of nature and placed at the disposal of man entirely new means of harnessing its powers. The invention of dynamos opened a new chapter in the history of mechanical powers. Formerly mechanical energy had to be used in its original form, but now it is possible to convert mechanical into electrical energy.

There are things that are perfect and practicable in theory, but when put to practice they fail disastrously. Similarly by reading the lengthy accounts of mechanical contrivances it would be wise to think twice before forming an opinion that it be possible with advantage to do away with the animal traction which is so essential to complete

the net-work of main route communications. It must be clearly understood that the mechanical means can be employed with profit only at places where the work is concentrated and is of a permanent character. In a place where the roads are in a bad condition or are absent, the installation of any mechanical contrivance is doomed to failure. Where mechanical means are too costly to be successful, the animal driven carts can always be employed with advantage. In short we must keep in view that everything in its place is best. It will be a serious blunder to entertain at the very outset an idea of entirely supplanting animal by mechanical powers. Leaving other countries aside, the conditions in India are such that it would not be paying to have a whole-sale application of mechanical means.

So far I have dwelt on general principles but now let me say something about the mechanical means that are employed at Dhoni for the extraction of timber. The modern means are at present the centre of wonder, as they so successfully demonstrate the possibility of a successful introduction of the new methods of working the forest—especially in the in-accessible areas. Everything is yet under an experiment, but it is hoped that the results obtained will be of immense value, and importance not only to the forest Department of Madras, but also other sister provinces in India.

Before explaining the actual working of the mechanical contrivance it will not be without interest to know some fundamental principles of applied mechanics. We have all heard about mechanical advantage and also about the Law of Conservation of energy. If we

deal with the above statements together we can safely say that there is nothing like mechanical 'advantage' or 'disadvantage'. Work is either equivalent to the product of force. and the distance through which it acts, or to the product of force and time during which it acted. In this connection it must be remembered that distance and time are as important as force itself. What actually happens is that if leverage is gained the distance and time are proportionately decreased and vice versa. The product of force into time or of force into distance remains unchanged. It is this principle that is utilised in lifting tremendously heavy logs by running the tractors on low-gear. Similarly the principle of differential pulley is applied in the 'winch' to increase its tractive power. By this means the heaviest logs are pulled up but the time taken to bring them up is also directly proportional to their weight. When light logs are lifted the 'winch' works on a light gear, and the logs are dragged up very quickly.

At Dhoni, there are only two tractors in all. One is the caterpillar type 5-ton tractor. and the other is a Ford portable type. Both the tractors work on petrol and when working, the power is utilised to work the 'winches'. The main drum of the caterpillar tractor takes 650 feet of $\frac{5}{8}''$ steel rope and the Ford type 1000 feet of $\frac{7}{8}''$ rope. There are two types of steel ropes—(1) main rope which is $\frac{5}{8}''$ thick and (2) out haul rope which is $\frac{1}{2}''$ thick. The winch of the Ford type is the best, and most efficient as it works automatically to roll and unroll the ropes. In the case of the caterpillar type the out-haul rope is worked separately by a pulley and is rolled around another wooden drum worked by hand.

The tractors work on road, and are well anchored by a thick steel rope to a tree so that the tractor may not be dragged towards the log instead of the log moving up—in compliance with Newton's third law of motion. The Ford tractor is mounted on a platform of logs, and the above mentioned principle is utilized in shifting the position from one place to another over short distances.

Below in the valley the cut logs are dragged and collected in a log dump, which is within the reach of main rope. A spar tree is chosen and blocks are put into it. The lower block is known as the 'heel block' and is chiefly meant to lower the angle of line force lest the tractor be lifted up. The main rope after passing the upper block which is at a sufficient height, is taken by the out-haul line to the "log dump". The logs are tied to the end of the main rope by a piece of wire which is about six feet long, and is provided with a moveable hook. This is a known as 'Choker' as it is tightned by the weight of the log itself.

The out haul rope is double the length of the main rope. Its chief use is to take the empty end of the main rope back to the log dump. The main rope and out haul rope are connected to each other in an endless method—that is when one rolls, the other un-rolls and *vice-versa*.

—Hukam Singh B. Sc.

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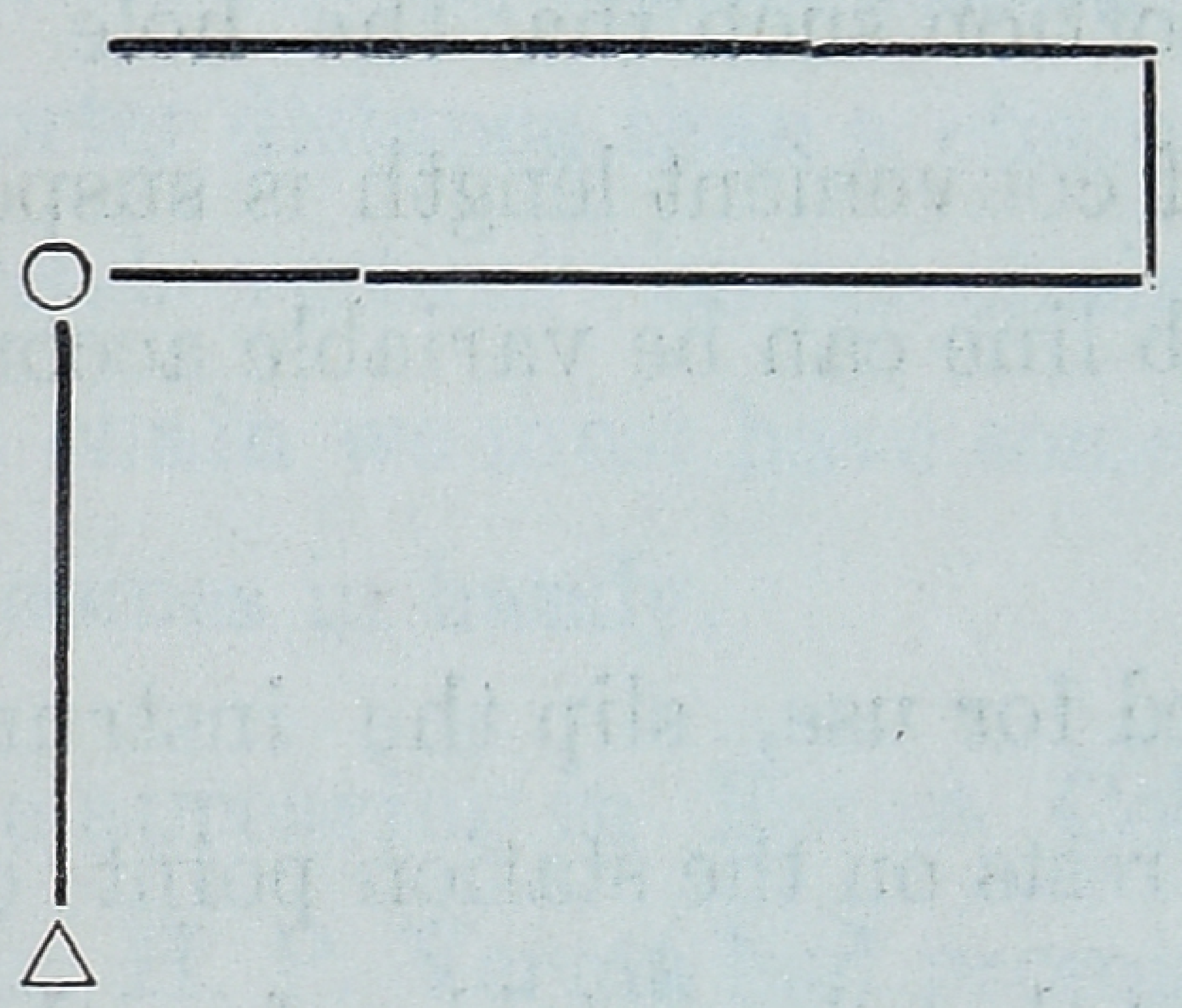
A simple instrument for setting up a plane table correctly on a given station.



Many surveyors experience some inconvenience in setting up the plane table on a station so that a point on the table lies vertically over the peg representing that station on the ground. This is often usually done by holding a pebble at an approximate place on the lower surface of the plane table, directly below the point on the paper, and dropping the pebble from there, and moving the table suitably until the pebble drops on the peg, by manipulating the legs.

This proceedure has got two disadvantages. Firstly it takes a long time for the adjustment of the plane table. Secondly the uncertainty in guessing the point on the lower surface of the plane table vitiates results.

To get over these difficulties the simple instrument represented by the drawing above may be used. It consists of an iron bar one fourth of an inch square; and about four feet long, bent in the middle like a pair of tongs, the two arms being parallel to each other, and about

six inches apart. The tip of the free end of the upper arm is bent downwards for about one eight of an inch, at right angles, and is pointed. The tip of the other arm, is beaten flat, and a small hole is bored through the flattened portion such that the hole is directly below the point. A plumb line of convenient length is suspended from this hole. The length of the plumb line can be variable according to the height of the peg at each setting.

When required for use, slip the instrument over the plane table, so that the point rests on the station point on the plate, and the plumb line hangs below the plane table; for the lower arm of the tongs will be below the plane table.

After the usual preliminary precautions such as rough orientation etc., by moving the legs of the plane table forwards and backwards, or side ways, the point on the plane table can be adjusted vertically over the leg, by adjusting the table to such a position that the plumb bob hangs freely vertically over the peg. This process saves much valuable time.

The idea is not absolutely new. Similar though more complicated devices have been in use, and the method is published here for the benefit of Forest Officers who happen by some chance not to have come across it before now.

A. MUHAMED AKBAR,

Student, M. F. C.

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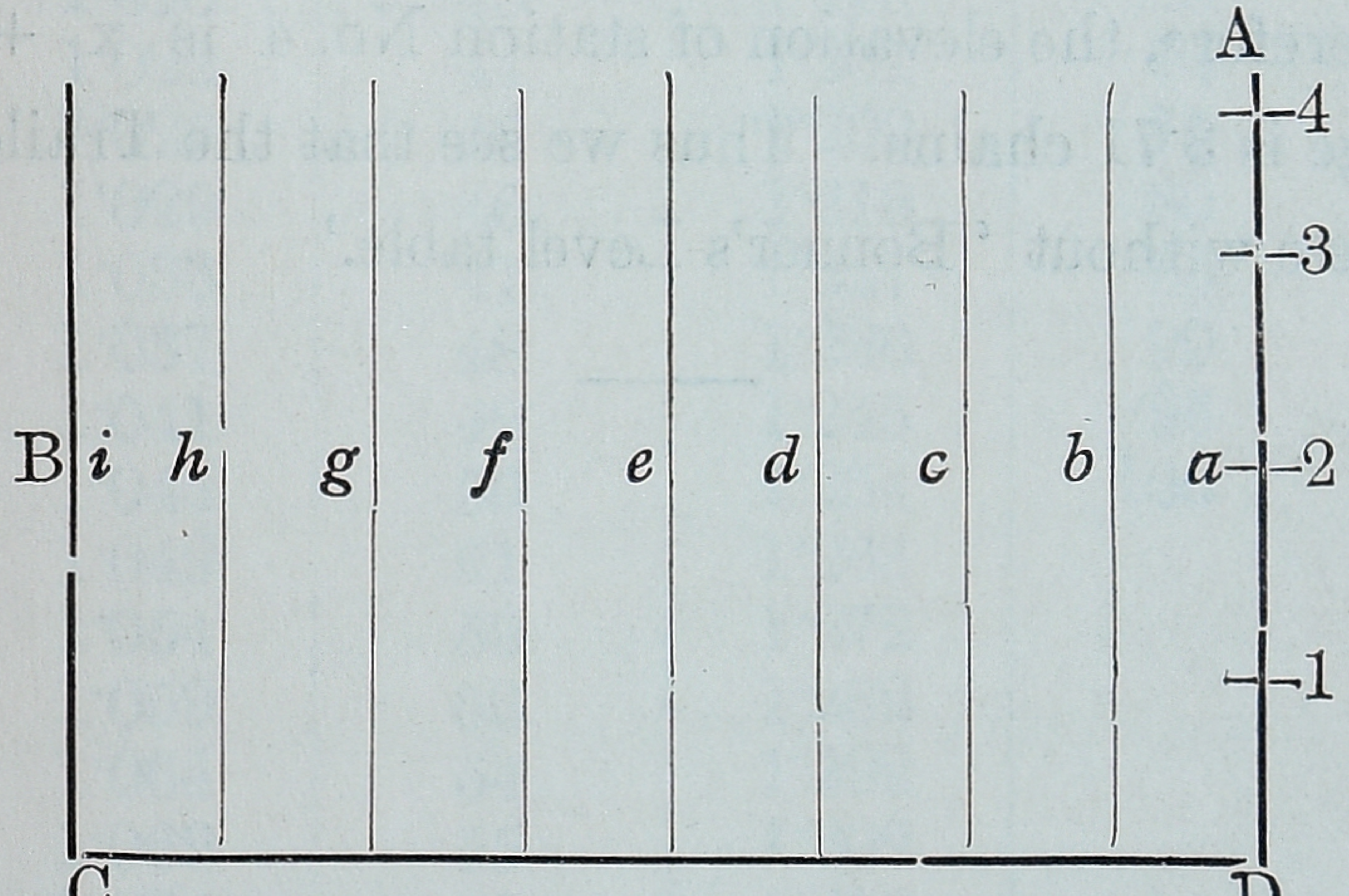
Tying up Strip line in Trailer taping.

It is not uncommon in Trailer taping that at the end of a strip line we get a shorter distance than a chain. The Improved Abney is so marked that it reads vertical rise per chain only. To get rise for a distance less than a chain we must have some other means. For this, Bonner's Level table comes in handy.

In an article appearing in Forest College magazine, No. 3, Volume X of 1926 Mr. H. P. Verma had promised to write a note on this in the subsequent issue. As he has not done so, I shall try to explain with the aid of the following sketch how strip lines are tied in in such cases with the aid of Bonner's Level table.



A. B. C. D is a base line and *a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, are strip lines. Now, after reaching third station on strip line, a, we find that the remaining distance is only 75 links. But your Abney reads only for a chain, and this distance is less than a chain. Never mind, you

take the Abney reading at peg No. 3 to peg No. 4. Say the reading is 20. This does not mean a rise of 20′ or a slope of 20° but only a gradient of 20/66. As this rise is for 1 Gunters chain horizontal distance, we now want the rise for 75 links slope distance. Looking up in the attached Bonner's level table we find against 20 reading a slope distance of 1·045 chains, or roughly 105 links. Now we will do a little bit of arithmetic and get the required figures.

For a slope distance of 105 links the rise is 20′. Therefore for a slope distance of 75 links the rise $= \frac{75 \times 20}{105} = 14{\cdot}28'$. Again for a slope distance of 105 links the horizontal distance is equal to $\frac{75 \times 100}{105} = 71{\cdot}4$ or 71 links.

Therefore, the elevation of station No. 4 is x + 14·28′ and total chainage is 3·71 chains. Thus we see that the Trailer tape outfit is not complete without 'Bonner's Level table.'

Bonner's Level Table.

Difference in elevation (feet per chain.)	Corresponding slope distance in chain.	Difference in elevation (feet per chain.)	Corresponding slope distance in chain.	Difference in elevation (feet per chain.)	Corresponding slope distance in chain.
1	1·000	31	1·104	61	1·362
2	1·000	32	1·111	62	1·372
3	1·001	33	1·117	63	1·382
4	1·002	34	1·124	64	1·392
5	1·003	35	1·131	65	1·403
6	1·005	36	1·138	66	1·414
7	1·006	37	1·145	67	1·425
8	1·008	38	1·153	68	1·436
9	1·010	39	1·161	69	1·447
10	1·012	40	1·169	70	1·458
11	1·014	41	1·177	71	1·469
12	1·016	42	1·185	72	1·480
13	1·018	43	1·193	73	1·491
14	1·022	44	1·201	74	1·502
15	1·025	45	1·209	75	1·513
16	1·029	46	1·218	80	1·571
17	1·033	47	1·227	85	1·630
18	1·037	48	1·236	90	1·690
19	1·041	49	1·245	95	1·752
20	1·045	50	1·254	100	1·915
21	1·049	51	1·263		
22	1·054	52	1·272		
23	1·059	53	1·282		
24	1·064	54	1·292		
25	1·069	55	1·302		
26	1·074	56	1·312		
27	1·080	57	1·322		
28	1·086	58	1·332		
29	1·092	59	1·342		
30	1·099	60	1·352		

U. C. TIWARY,
1925—27 Division.

My most interesting day in the Forests.

(Winning essay for the "Indian Forester" Prize for 'present' students, 1927.—By **P. G.** *Rao, Senior Student.*

The day that interested me most in the walk of forest life dates back to the year 1921, when the Non-co-operation moment was in its full swing in the Guntur District. The common folk in the forest villages, having received concentrated intra-veinous injections with effective ampules of seditious preaching delivered openly by the so-called propagandists of the movement, took up their banner against the forest subordinates. Day by day, the people became more and more ill-spirited, and the matters assumed a stage, when no Forester or Forest Guard, owing to the social boycott of the forest villagers at every step, could either live in the villages or do their legitimate duties in the forests. The forests were looted by the bands of villagers in head loads, ass loads, and cart-loads and the charity of the stolen property extented from father-in-law to son-in-law and his friends, and friends to their friends in distant villages. All the closed areas under regeneration were strictly closed with herds of cattle penned inside.

The then Range Officer of the Vinukonda Range, having well studied the situation, summoned all the subordinates of the Range and organised them into a strong party headed by me, the Forester. The party then made a move with full camp equipment to a central village in the Range with the Range officer.

We had information that about a thousand cows were kept penned in a closed area of the forest guarded by about seventy villagers. The Range officer having come to know of this issued orders to me late in the evening to go to the spot immediately with my party, and see that at least some of the cattle are impounded and some of the men brought before him for necessary action.

Next day early morning, at about 4 a. m. I set out to the forest with a strong party of four Foresters and twenty two Forest Guards, in all twenty six in number. Before day-break we reached the spot in a forest where we could safely lie in ambush watching the movements of the cows and the villagers.

The cattle left the pen at about 7 a. m. for grazing, followed by the sturdy grazier-men who by their sheer force and strength could easily overpower us. Many of the graziers happened to be men of influence and wealth and crimininal force was all for them to defend their position in those days.

I had my own stratagems preplanned to meet effectively with the situation. I found no way out but to tackle the graziers with tact and I dressed myself in Khaddar (country made cloth) to pass before them for a Non-co-operator of the day. My action was purely actuated by good motives and as such, 'bonafide', I had my defence under section 61 of the Madras Forest Act. With the dress thus changed I equipped myself with all the necessaries to make an ideal detective.

The sun was rising up and it just passed the meridian. It should be about 1 p. m. It was usual for the cattle to go to a tank

near by to drink water, and was the time for the graziers to take rest for an hour or two after taking in their midday 'Khana' (meals.) By noon I split up my party into two batches and one batch of the two Foresters and eight Guards under the leadership of the Foresters was instructed to proceed to the tank concerned, unnoticed by the graziers, waiting for an opportunity to drive as many cattle as possible to the pound.

The other batch I was to lead to create an easy opportunity for others to carry out my proposals successfully. I walked towards the cattle paths leading to the tank from inside the forest with my followers. The cattle were seen coming down for water followed by the villagers and it was time for me to act, I should so manage as to be their object of attraction and I was sure that a lecture on a subject very pleasing to them, would serve the purpose. The subject chosen by me was one of interest to the forest villagers at the time. With a small audience of my own followers I started my lecture condemning the illegal actions of the lower forest subordinates and the resulting worry caused to the people at large. I laid stress on the good-will and co-operation of the forest villagers for the proper and useful working of the forests. I found an appreciable increase in my audience, in a short time, by the addition of the graziers following the cattle. I felt that I had gained some ground in my attempt and elaborated my lecture in a way most pleasing to my new audience. I explained to them the facts that the real interests of the Government in the management of the forests have been based soley on the welfare of the present and future generations of the people, mostly in the forest villages, and

how the beautiful forests of the old had been indiscriminately destroyed resulting in the necessity of their being reserved, protected and improved at the present day. I spoke at length about their very industry, agriculture and its relationship with the conservancy of forests to feed springs, rivers and channels and emphatically declared the benefits derived therefrom to be enjoyed by them directly or indirectly. I pointed out the object of the Forest Department was to teach and educate the people to manage the state forests in the interests of the public at large by self-constituted bodies for the benefit of their own kith and kin, as exemplified in the introduction of the Panchayat and the Village forest systems of the day. I had convinced them of the fact that their co-operation with the Government was absolutely necessary in their own interests but I studiously avoided talking anything of their illicit grazing for the time being.

They became more and more interested in my lecture and followed me about a mile away fram the tank, but alas! poor villagers not knowing that they have left behind their cattle which were being driven away to the pound by my other batch. I had been lecturing for about an hour and I found the villagers to be good and willing audience.

Suddenly, we saw a grazier-boy running to us with the in. formation that he had seen from the top of a hillock some cows being driven away to the village side by some people whom he could not identify from a distance. The graziers, in front of me, on hearing the news were quite perturbed and were at a loss to know how it happened and who the drivers were. They questioned my batch whether

any of their men had gone patrolling elsewhere in the forest and the reply was cleverly in the negative. They were cocksure that no forest subordinates could dare drive their cows in those days and to add to it my party stood seemingly unmoved by the news.

Now I was glad within myself that a portion of my plan was successful and I had to accomplish the further plan of bringing the offenders to book. We found later on that only about twenty per cent of the cows in the forest, that is to say, about two hundred in number were found missing from the group.

All the graziers, in a voice, requested me to accompany them to rescue the cows, but they half suspected my batch who also now traced their steps back in the direction of the cows driven by the other batch. In fact my dress then saved the situation. At first, I showed no inclination to follow them pretending I was bound elsewhere till they pressed me on and on to be with them when I consented at last to follow them and in fact, this was what I wanted then.

We walked off towards the village in a hurry but I lagged behind on approaching the outskirts of the village fields, on the plea that I was a poor walker. The graziers ran to the village following the traces of the cows leaving me behind to join them soon but I took my own way unnoticed by them, got into the village and appeared in full uniform before them near the pound.

In the village I found what I had expected. Before the pound,—the ring leaders numbering about twenty-five, the Range Officer with some of his subordinates, the village munsif with his

village police and the two beat police constables all numbering about fifty on the Government side were found. The cows were impounded and the offenders were arrested when they refused to give their names and they were handed over to the police.

The prosecution was launched and the case was disposed of within a week by the special touring Forest Magistrate. The judgment was pronounced and an exemplary punishment was meted out to the accused.

This case which was successfully detected by my party proved to be a turning point in the affair of the neighbouring forest villages. The villagers were brought to their senses and they learnt at a great cost that peaceful submission and obedience to the Forest Laws would ensure their happiness and prosperity in the long run. To conclude, peace and order were restored in the villages affected by the Non-co-operation movement.

'Tact.'

Prize day at the Madras Forest College 2nd July 1927.

On the 2nd July 1927, which was the concluding day of the "Forest Week", a large and distinguished gathering of officials and non-official Europeans and Indians assembled in the spacious hall in the Madras Forest College to witness the distribution of certificates, medals, and prizes to the fourteenth batch of trained students. The Hon. Khan Bahadur Mahomed Oosman Sahib Bahadur, Member of council in charge of the Forest portfolio presided.

Prominent among those present were:—Mr. R. D. Richmond, Chief Conservator of Forests; Mr. & Mrs. Martin; the six conservators, Messrs. A. Wimbush, T. A. Whitehead, A. A.F. Minchin, F. R. Madan, Rao Sahib K. R. Venkataramana Ayyar avergal, and Mr. Littlewood; Mr. and Mrs. J. K. Pearce; Mr. and Mrs. J. W K. Wernham, Major W. F. Chipp, Messrs. J. A. Master, J. M. Sweet, R. S. Browne, W.C. Hart, E. V. Padmanabha Pillai; Mr. Bridge; Mr. A. R. Cox, I. C. S., Dewan Bahadur, M. Krishnan Nair, Rao Bahadurs C. S. Ratnasabapathi Mudaliar, T. A. Ramalinga Chettiar, T. S. Balakrishna Ayyar, and M. R. Ramasami Sivan; Mr. and Mrs. H. P. Ward; Mr. W. G. Dyson; Mr. L. Green I. C. S., the Rev. C. E, Wheeler, Mr. C. Tadulingam, Mr. C. V. Venkataramana Ayyangar, Mr. A. S. Laurie, Rao Sahib M. Venugopal Pillai.

Mr. C. R. F. Williams, the Principal, opened the proceedings by addressing the gathering as follows:

"Before proceeding with the usual brief survey of this year's work and play, I should like to extend, on behalf of the College a very hearty welcome to Dr. Oosman Sahib who has so kindly consented to take the chair today. This is the first time we have had the pleasure of his company on our Prize day, and I hope that his duties will permit him to be present with us on many such occasions in the future.

"We have only had one change in the Staff during the last twelve months, when Mr. Chandy relieved Mr. A. R. Brand, who took long leave. Our curriculum is primarily practical and the college is staffed by officers who are deputed from their ordinary work for two years. It will be seen therefore that these changes of staff tend to ensure that the instruction is of a practical nature and Instructors are able to illustrate their lectures from their own varied experience.

"Mr. Bridge, our Forest Economist, very kindly gave a series of lectures to the Senior students, while Mr. Pearce, although prevented by his duties as Chief Forest Engineer, from giving his usual lectures on Logging Engineering, took advantage of his brief visits to us on two occasions to give the students very valuable informal talks on map making. Also while at Ooty he actually demonstrated his principles in the field.

"A new departure this year was a short series of lectures by the Inspector of Livestock Mr. Devadoss, who in the course of 4 lectures gave the students a comprehensive account of the care and upkeep of elephants.

"These lectures from experts, are, I am sure, of the utmost value to the students.

"Our College course lasts two years, and we have therefore a Junior and Senior Year.

"The Senior Division began the year 29 strong all of whom sat for the Final Examinations. The result of the examinations show that the general standard is about the same as last year, the class average being 66.4%. The highest student obtained 78.9% marks and the lowest 54%.

"No student obtained Honours, the standard for which has been considerably raised, and before a student can be considered now he must obtain 80% marks.

"Twenty six students obtained Higher Standard Certificates and three students Lower Standard Certiffcates,

"No student failed to qualify.

"The students from the Central Provinces for the first time carry off almost all the prizes, and the average standard of intelligence is much higher than has been the case in preceeding years. The Madras students, due to the fact that we are training the last few members of the old Deputy Ranger class, are very much below the average of Madras students of earlier years.

" As usual, students find difficulty in expressing themselves really intelligently in English in technical subjects.

"The Junior Division is 33 strong and is doing very well indeed. The class average is 65·6 % to-date, and the lowest student scores 56 %. This is above the average. It is interesting to note that the top student of the Division is a Bombay man for the first time.

"*Tours*. Five months of the year were spent in camp in accordance with the usual programme, and our thanks are due to the District officers, and their staffs who all helped to make our camps instructive and pleasurable.

"*Athletics*. Turning to Athletics, which as you probably know, is a compulsory part of our curriculum, and from our point of view a particularly important one.

The Junior Division has produced a number of very useful members in all divisions of sport, and because of this we have done exceedingly well all round.

"*Grigg Sports*. At the Grigg Sports we easily won the aggregate cup for open events by securing two firsts, two seconds, and a third. Student Ragaviah took two firsts and a second.

"*College Sports*. Our College Sports were again held in September and as the weather was fine, we had a very successful afternoon. The Richmond Cup which is awarded to the student obtaining the greatest number of points in the more important events was won by A. Ragaviah who secured four first places and one second, and totalling more than double the number of marks obtained by the next competitor.

"The Marathon Race over a seven mile cross country course was won fairly easily by the Senior Division, who obtained 9 out of the first twelve places. The race was won by student Boota Singh who took 49 minutes 10 seconds.

Hockey. Our hockey team has been very good indeed this year and out of 10 matches played we won nine and drew one. We won the local Hockey Tournment quite easily.

Cricket. Our Cricket Team too has been above the average and after a series of exciting matches we won the local Cricket Tournament Shield in a final match against the Coimbatore United Team, who were very unfortunately prevented from turning out their best side.

"*Cowley Brown Cup*. The Junior Division won the Cowley Brown Cup for interdivisional Hockey by 3 goals to nil after a very good game.

"Our students while at the College are subjected to semi-military discipline, and I think that there is no doubt that our system of regular exercise consisting of compulsory games, and daily physical training combined with regular medical attendance turn out a very smart, healthy student. The difference between a class on arrival at the College and on departure is most marked.

"The general standard of health and discipline has been satisfactory.

"May I now ask Dr. Oosman to be so kind as to present the prizes and certificates:—

1. Campbell Walker Prize. The best student in Forestry:—

Umachand Tiwari.

2. Gold Medal for the best Senior student on marks:—

Hukum Singh.

3. Brazier Prize for the best practical all round Ranger:—

Hukum Singh.

4. Lodge Prize for Engineering:—

Hukum Singh.

5. Madras Conservators' Prize, for Survey and drawing:—

Hukum Singh.

6. Prize for writer of best essay contributed to M. F. C. Magazine during 1925-26:—

Hukum Singh.

7. Indian Forester Prize for the best essay by present students.

P. G. Rao. (1925–27 Dn.)

8. *Twenty six Higher Standard Certificates (in order of merit.)*

1.	Hukum Singh	....	Central Provinces.
2.	Ahmed ullah Khan	...	do.
3.	Umachand Tiwari	...	do.
4.	R. Rama Ayyar	...	Madras (V circle.)
5.	Jang Bahadur Singh	...	Central Provinces.

6.	P. Gopalakrishna Rao	...	Madras (I circle.)
7.	K. Poovappa	...	do. (VI circle.)
8.	Baharam Gattewar	...	Central Provinces.
9.	Alexander J. Misal	...	do.
10.	Kewal Krishen Bakshi	...	do.
11.	Mahammad Shafi	...	do.
12.	T. M. Janardanam	...	Madras (Eng. Dept.)
13.	A. Neeladri Rao	...	Madras (I circle)
14.	Boota Singh	...	Central Provinces.
15.	Kashmiri Lal	...	do.
16.	H. R. Dutt	...	do.
17.	C. Ramamurthi	...	Madras (II circle)
18	B. B. Mehta	...	Central Provinces.
19	Rash Bihari Gupta	..	Bihar and Orissa.
20.	Shaik Muhammad	...	Madras Eng. Dept.
21.	Sadasiva Rao Pitalay	...	Central Provinces.
22.	Badri Prasad Sarma	...	do.
23.	Jagan Nath Sud	...	do.
24.	Syed Hamid Husain Khan	...	Hyderabad (Deccan)
25.	Durgacharan Patnaik	...	O F. S.
26.	A. Sitarama Sarma	...	Madras (V circle.)

9. *Three Lower Standard Certificates.*

27.	Mahamud Dhost Ali Khan	...	Hyderabad (Deccan)
28.	Bankey Lal Garga	...	Central Provinces.
29.	S. M. Ansar Ali	...	Madras (I circle)

10. Chief Conservator's Prize for the best Junior student.

B. Wadhwani.

11. Pentland Shield for best all round athlete.

Kewal Krishen. (Hockey and Cricket Captain.)

12. Cowley Brown Cup for the Interdivisional Hockey.

Junior Division.

13. Fischer Cup for Tennis.

Kewal Krishen.

14. Moopil Nair Cup for Marathon Race.

I. Boota Singh

II. R. B. Gupta.

15. Swimming Medal.

B. P. Sharma.

16. Range Administration Prize.

R. Rama Iyer.

17. Botany.

Hukum Singh.

18. Tennis doubles.

A. J. Misal, and B. K. Chaudri.

19. Hockey Sixes.

Sohan Singh.
M. Ahmed Khan.
S. Bohidar.
M. Chitre.
Rajaram Pillai.
G. Patil."

The President then made the following speech:—

"It has given me great pleasure to be present on this occasion and to participate in your annual function, and I have to express my thanks to the Chief Conservator of Forests and to the Principal of the

College for giving me the opportunity. I see from the report of the working of the College what a strenuous time the students have had in the College and in camp, and I dare say you are all aware that in the wider field which will be open to the students after their training is over more strenuous and more difficult work is awaiting them. You are all aware the troublesome work of looking after small scattered forests which brought the department into some odium with the people has been taken over by Forest Panchayats on a large scale, and the Forest department has more time to attend to more important work.

"At the same time, I hope that the officers of the department will not cease to take a lively interest in the welfare of these transferred forests and that the panchayats who now control them will not fail to receive from the department such friendly assistance and advice which they may need. This transfer has enabled the forest department to embark on a new phase of activity—scientific exploitation according to modern methods—and this new development will demand all their energies. I am confident that they will—one and all—freely respond to the call and make the best use of the training which they have received in the College. For nearly half a century we have been conserving our forests; the forest officers of the past have by their single minded and earnest efforts, left us a splendid heritage; they have laboured and we have entered on their labours. It is only right and proper that we should now make the best use of this heritage. Exploitation is but the coping stone of the policy of conservation. There is, of course no idea of sacrificing our forests or of merely getting revenue from them

regardless of their condition. In view, however, of the large extent of commercially exploitable forests in this Province we can and must be able to derive a fairly large revenue from these forests without doing any injury to them so that more money will become available for essential schemes of development.

"Some of you here may perhaps remember the speech made by His Excellency the Governor on a similar occasion here last year and the appeal which he made for support of a forward Forest policy. The Forest Department is indeed happy to have at the head of the province at this psychological moment one who takes such an abiding and absorbing interest in Forestry and forest development as His Excellency Lord Goschen does. I am confident that His Excellency's appeal has not fallen on deaf ears, and that it is now being everywhere recognised that it is essential in the financial interests of the province and for its general development that the great resources locked up in our timber forests should be more fully utilised than they have been in the past. The problem of better utilisation is a difficult problem; it is an important problem—all the same. The right solution of it will need the best which the officers of the department can give and I am sure they will give their best without stint or cavil and that their efforts will be seconded by the subordinate trained staff to the best of their ability. Their interests have been and will continue to be my special care, and no effort on my part will be wanting to apply prompt remedies to the just grievances of every one in the department from the highest to the lowest. Before I resume my seat I should just like to

refer to the high compliment paid by the Government of India to the Forest Service in Madras by appointing its head Mr. Tireman as Inspector-General of Forests. It is of great satisfaction to Government that he has been succeeded by Mr. Richmond, an officer who has already made his mark in the department for efficiency and good administration. I am sure that during his regime there will be a great progress in the department in all directions." (Applause)

Mr. R. D. Richmond, the Chief Conservator of Forests, then addressed the gathering as follows:—

"Dr. Usman Sahib, Mr. Principal, and Ladies and Gentlemen,

"I should first like to endorse the welcome which the Principal has extended to the Hon'ble Member in charge of the Forest Department, on this the first occasion on which he has presided at one of these functions. We know how many other preoccupations he has, and we reckon ourselves fortunate that Dr. Usman Sahib has been able so to arrange his tour as to be with us to-day.

"I must next congratulate those whose course of study at this College has just been successfully completed, and who are about to enter upon the duties for which they have been trained. As we have been told the average of the class is a good one, in spite of the fact that no student is of sufficiently outstanding merit to warrant the award of Honours certificate to him. The staff of the College is also to be congratulated, for, it is the average which counts, and the skill of teaching lies in bringing on the more backward.

"I have been particularly interested in reading the reports of the examiners and in discussing with them their impressions of the ability of the men they have examined. It is very evident that they have spared no pains in trying to find out what the students know, rather than what they do not know, which is a practice, in a particularly easy enterprise, of some examiners, of which one still retains somewhat bitter recollections oneself. It is a matter for remark that in the majority of cases the students have done better in the oral part of the examinations than in the written papers, and this, too, points to the patience which the examiners must have exercised. There is one observation by an examiner which provokes remark, and that is to the effect that he was struck by the fact that that the students thought intelligently; that is, that they could apply what they had learnt, and did not merely quote from the text books, and I would impress upon all you students how very important this is.

"Those of you who are passing out of the College today to take up the duties for which you have been trained must not imagine that you know everything—if you have in the course of your studies here been trained how to learn, much will have been accomplished. Forestry is not an exact science, and the older one gets the more one realizes how little one actually knows and that the process of learning is never at an end. The profession you have chosen to adopt, and I say chosen advisedly, for that choice made you cannot reasonably complain later that your lot his harder than that of others, is an exacting one, though full of compensations. The work is hard, it often has to be performed in discomfort, in loneliness, in the face of opposition, subject

to many temptations and the highest qualities are required in the making of a thoroughly efficient Range officer. Remember, I would ask you, that easy as it is to be superficially efficient, if I may coin a phrase, it is the steady worker, who attends to *all* branches of his duties, whether they be in the spotlight or not, who will count. There is a tendency, a modern one, for Range Officers to pass on to their subordinates duties which they should themselves perform, and which those subordinates are not qualified to undertake—this tendency it will be my concern to check, for efficient work cannot be the result.

"The Principal has laid some stress upon the athletic and games sides of the activities of this College. This part of the training I regard as of prime importance. I would not, however, have you understand me to mean that the result of a game is of any particular importance, and I regard as the best games those to which no rewards or prizes are attached. It is good to win, and we should all strive our hardest to win at whatever we may undertake, but games mean more than this. They teach us to take the ups and downs of life cheerfully, to be unselfish, to be disciplined, and above all, to work as a team without jealousies and with a common end in view. Also, if you are to be efficient at games, you must keep your bodies fit and live cleanly; these habits once formed will persist aud you will be the better able to undertake the arduous physical exertions which are demanded of us all as Forest Officers.

" I have, unfortunately, so far seen less of the college at play than I should have liked to. The other evening we saw a hockey match between the two divisions, and I was impressed by the clean way in

which it was played. Hard knocks were taken and given, the game was played with great keenness, without loss of temper, and no selfishness could be detected. And in another game, the cricket match on Thursday, one of the most enjoyable in which I ever took part, I was glad to note the same spirit displayed and I trust that it taught the lesson that a battle is never lost until it is actually won. If we can teach the students to play their games in this way, and without partisanship on or off the field, much will have been achieved.

"We are all parts of a whole, wheels in a machine, each with its own function to perform, the complements of one another and useless alone. The other man's job always seems easier than our own, but all are essential. The wheel that creaks loudest may be the one to get the grease, but remember that, in the efficient machine which I am attempting to picture, the interests of all parts are borne in mind by the management and in wishing every success to those of you who are about to set out on life's work. I would remind you that in our work, as in our games, we must act together as a team if success is to crown our efforts."

The gathering then made a move downstairs, and partook of refreshments which were served on a lavish scale. H. E. the Governor's band which had been specially requisitioned from Ootacamund, was in attendance at the party, and discoursed a choice selection of music.

EXTRACTS.

(1) *Protecting Wood from Moisture.*

The problem of preventing the warping and twisting of wood under varying conditions of moisture is a serious one for all users of this important material. Recently the Forest Ptoducts Laboratory of the United States Department of Agriculture has undertaken to study this problem carefully, and tests made were conducted with the idea of determining the value of different types of wood coatings in preventing warping of test specimens under various moisture conditions. The conclusions reached are summarised of follows :—

"Linseed oil is commonly considered to be an excellent moisture proofing material, but we have not found it so * * *

Wax coatings similar to those used on floors do not rate high in moisture-proofing value.

* * Spar varnishes are low in moisture-resistence as compared with rubbing varnishes. For instance, the efficiency of spar-varnish when new, averages about 57 per cent, and that of rubbing varnishes, 83 per cent. Apparently the greater amount of gum present in a rubbing varnish accounts for the difference.

The addition of a pigment to a varnish or oil increases its efficiency in keeping out moisture. An oil paint is far more effective than linseed oil alone, and an enamel shows a marked improvement over varnish.

Aluminium powder is very effective in keeping out moisture when used in the preparation of a coating. When freshly mixed with the vehicle, it leafs out, forming a very effective barrier against moisture changes. Probably the most striking illustration of its value is in raising the efficiency of bronzing liquid on first exposure from about 12 per cent to 92 per cent, a gain of 80 per cent Addition of aluminium powder also increases the efficiency of spar-varnish by about 40 per cent. From one or two pounds of powder are required to the gallon of the vehicle.

The majority of asphalt, and pitch paints have good moisture resistence. Their efficiency however, may also be improved by the addition of 10 to 20 per cent of aluminium powder. In some cases the powder will leaf out and rise to the surface, hiding the black colour.

Probably the most effective protection against moisture changes is the aluminium leaf coating. This process simply incorporates a layer of aluminium leaf in the coating, and provides a very strong barrier to moisture. The efficiency of this coating is about 98 per cent. It was developed particularly for use on airplane propellers, where very slight changes in moisture content are important.

Cellulose lacquers have an efficiency of a little over 70 per cent when new, and cellulose enamels about 5 or 6 per cent higher.

Shellac has a remarkably high moisture-proofing value of about 88 per cent—but does not stand up very well when subjected to the weather.

It is important to know that none of our ordinary coatings is absolutely water-proof. All permit tne passage of moisture to some degree and if extreme conditions persist over a considerable period of time injury may result to glue joints and wood work which they cover.

In conclusion, a precaution is given to manufacturers who seek to prevent warping when applying a coating 'to one side only of the article to be protected. Few manufacturers realise the effect that coatings may have on warping. In many kinds of goods, one surface of a panel is finished with a very effective coating while no attention is paid to the back. When moisture changes take place the gain or loss of moisture is greater from the exposed side than from the coated side, and if the changes occur rapidly warping' is almost sure to result. Such difficulties may be avoided by applying to the backs a cheap coating which will balance the face coating in moisture resistence. Such practice would reduce the rate of change in moisture content and permit better equalisation of absorbed moisture.

Extract from " Scientific American', March 1927.

* * * "

(2) *How far can a deer jump ?*

Archibald Rutledge in ***St. Nicholas*** reports an interesting conversation with a famous old woodsman of the Carolina swamps on the wild deer's jumping powers. The old gentleman cited this case: " I once measused the jump of a deer which sprang from its bed—that is, the first jump it made from a position flat on the ground. I had approached this deer on foot across the dry bed of a pond, lined with soft moss, and was

within about eight feet of the creature when it sprang up and away. It had been lying at the base of a huge pine in a tiny clump of bushes. There was a space of black damp sand surrounding the pine, so that I was able to measure the jump with certainity. It was I4 ft. 1 inch. But remember that this jump was made from a lying down position; while running the average jump of the white tail is from 15 to 20 feet but by small effort a mature deer can increase this distance amazingly."

Extract from American Forests and Forest Life Feb. 1927.

* * * "

(3) *Match industry in Bengal during 1925.*

" A number of large and up-to-date match factories have been established in and near Calcutta, eight in all, and the approximate output of these factories will be of the order of 13,000 gross boxes of matches per dium .... It appears that the cottage system for the manufacture of matches will not be able to hold its own, and face competition with the modern factories using up-to-date power driven machinery.

Though many species of wood in the Bengal Forests have been found suitable for the manufacture of first class safety matches, little advance has been made in the utilization of these species chiefly on account of the scattered occurrence of these woods, and also on account of the unfavourable Railway rates.

Most of the factories are using imported logs chiefly from Sweden and Siberia though some of the factories have been trying to use *Excaecaria Agallocha* wood which occurs plentifully in the Sunder-

bans .... Though first class splints comparable to the splints made from imported wood could not be produced, nevertheless it has been demonstrated that matches of good quality can be made from this wood ...."

Extract from the Anuual Administration report of the Department of Industries, Bengal for 1925.

* * * *

(4) *On the twisting of tree trunks*: (Paul Von Oye, Bull, Soc. Bot. De France, 1926.) —

"The author .... dealing with broad-leaved trees only, has come to the conclusion that spiral growth is to be traced to variations in the root system. He finds that as long as a tree has a predominent taproot, twist does not appear but as soon as spreading roots replace the tap, twist will be developed if the laterals join the base of the trunk in a tangential plane unless their effects cancel out. The idea is worth further examination. The change in percentage of twisted stems alters with age in the same way as one would expect for the known changes in the root system & it is considered that the tendeney to develop twist is a specific character, varying in degree with the species. The author also finds that conditions on a slope are much less favourable to the development of twist (laterals tend to be produced mainly along the contours, and to cancel out) than on the flat, whence the wonderfully practical deduction that to keep down the percentage of twist, trees should be raised on slopes, and transplanted later ! ....

It is at once apparent that the author's theories are inapplicable to conifers which commonly begin with a left twist, and may finish up right-handed, and this fact robs them of general application."

Extract from "The Indian Forester" for April 1927.

* * * *

(5) *Forestry in Illinois and Great Britain.*

It is common knowledge that the drain upon the world's resources of coniferous timber is very heavy, and that in some countries the outlook is regarded with increasing disquietude. In the "Third Report on a Forest Survey of Illinois," by C. J. Telford, the position of the State is explained with great clarity, and the parallel to the state of affairs existing in Great Britian is depicted. The present forests of the United States contain an estimated total of 481,800 million cubic feet of standing timber, the annual cut is 25,000 million cubic feet and the annual growth 6039 million cubic feet; "The virgin forests," the report says, "will carry us another 25 years, after which we shall probably be wholly dependent upon growth from cut-over lands. By utilising the entire 470 million acres of forest lands at prevailing rates of growth these cut-over lands can supply us with an estimated annual yield of 14,000 million cubic feet—a little more than half our present requirements. The conviction that satisfactory substitutes for wood will be found is untenable when the enormous amount of wood required is appreciated. This drain of 25,000 million cubic feet of standing timber a year means that for every hundred pounds of coal, iron, cement, petroleum and copper consumed the forests supply 67 pounds

of wood, and the crop lands supply 44 pounds of all forms of crops, including cereals, seeds, clover, hay, forage, cotton, potatoes, sugar, fruit, and nuts. It is obvious that a satisfactory substitution for a commodity representing by weight two-thirds of virutally all the minerals consumed, or one and a half times all crops raised in the United States, is impossible. A timber famine will be more disastrous to Illinois than to any other State. Its manufacturing establishments employ 11.6 per cent more hands than agriculture, transportation, and mining combined, and thirty per cent. of all persons employed in manufacture are in industries dependent upon wood. In the single item of lumber, Illinois consumes one-thirtieth the total lumber-cut of the world."

The process of forest destruction is far advanced in Illinois. Virgin timber has practically disappeared, and the present drain on the cut-over forests and second growth stands, unchecked, will, it is held, result in an early disappearance of all forests in the State. There was an increase in unforested waste land of 250,000 acres in the ten years from 1910 to 1920, and Illinois now has a total of 1,577,663 acres in this class. The 3,021,650 acres now forested are on lands unsuited to ordinary farming, and if cleared will generally revert to waste land. The state of affairs thus briefly delineated is sufficiently alarming from the industrial outlook alone and renders the more interesting the following comparison with the position of Great Britian.

"There is a striking parallel between Illinois and Great Britian in the total wood consumption and in the total area forested. Each

annually consumes approximately the same quantity of wood—560,720,000 cubic feet for Illinois, and 600,000,000 cubic feet for Great Britian; each has about the same area forested—3,021,650 for Illinois and about 3,000,000 acres for Great Britian. But Great Britian, despite a population of 437.5 to the square mile as compared with 115·7 in Illinois, and the consequent pressure for land, has deliberately undertaken to replant 1,770,000 acres, and this planting is being done at the rate of 20,000 acres a year. Illinois has never planted 200 acres of publicly owned forests, her farm woodlands are decreasing at the rate of 4500 acres a year, and the unimproved and waste land on farms is increasing at the rate of 25,000 acres a year.

—Extract from Nature, January 1927.

(6) *Going – going – gone : the mosquito* :

.... Dr. Jordan's mosquito fish is a tiny fishlet less than an inch long that thinks the best dessert it have ever been indulged in is the larva of the mosquito. As the mosquito prefers human blood for its own dessert, we have our choice between feeding mosquitoes on ourselves, or feeding mosquito fish on mosquitoes.

"These fish ***(Gambusia)*** owing to the enormous numbers which develop in ponds and streams, are more effective against mosquito larvae in Rome, than they were in America. They will penetrate many kinds of horizontal acquatic vegetation, and will do away with from 80 to 90 per cent of ***Anopheles*** larvae. There are many types of water, however, both permanent and intermittent, to which they cannot adapt themselves, and our judgment is that although they are a great help in anti-mosquito work, conditions are rarely such as to make it unnecessary to do any other type of anti-malarial work. However as their introduction is inexpensive, and their maintenance charges practically

nil, they represent a measure of which practically any community in mild climates can avail itself.

Extract from "Scientific American," April 1927.

* * *

The British Empire has 1,100,000,000 acres of woodland, and only 1,100 forest officers, i.e. one forester to every million acres. This was the statement of Lord Lovat at the annual meeting of the Empire Forestry Association in London.

* * *

The demand for wood is not diminishing. In spite of substitutes, in spite of the fact that we boast of an age of steel, concrete, and coal, the use of wood all over the world is increasing. Consumption has doubled within the last fifty years. The above is the statement of Raphall Zon, F. E. Director, Lake States Forest Experiment Station, U. S. A.

* * *

The annual consumption of newsprint in the United States now runs nearly 60 pounds per Capita. The total annual production of paper products is the U. S. A. is now ten million tons.

* * *

What is said to be the largest Douglas fir tree in the world stands 15 miles south east of Eatonville, Washington. The tree measures over 14 ft. in diameter, is 48 ft. in circumference, 225 ft. high and 90 ft. to the first limb. Its estimated age is 800 to 1000 years. It is believed to contain approximately 125,000 board feet of lumber, or 250 cords of wood.

* * *

***From Tree to Press*:** To determine how quickly a tree could be transformed into newspaper, three trees in the neighbourhood of a German paper mill were cut down at 7-55 A. M., swiftly barked and

pulped and made into a roll of paper, and was ready for use by a near-by newspaper at 9-34 A. M. The presses began turning at once, and by 10 A. M., newsboys were selling the papers in the streets.

Extracts from "Forest and Outdoors" April 1927.

* * * *

(7) *Gems extracted from the written answers to questions upon Forest Engineering.*

A retaining wall is a wall on a leeward slope.

" * " *

Soleing a road is laying stones on the ground with the hands.

* * * *

A Fair weather road may be made with ups and downs.

* * * *

A Fair weather road is for high class traffic such as motor cars and taken in a zig-zag manner not to harm the crops.

* * * *

Sand for concrete should be angular.

* * * *

A Fair weather road should not be made straight but should be made with curves otherwise the way will become weary.

* * * *

ERRATA.

"On the working of Hydraulic Rams in general, and of the Blake's Hydraulic Ram at Kargudi, in particular" published in March 1927 issue.

Since handing in my article on the above subject for publication I have been on tour, and therefore missed a chance of seeing the proof before final publication. Certain typographical errors and ommissions have therefore crept into my article. I take the present opportunity

of correcting those errors, and also some grammatical and other errors, for which I regret I am wholly responsible.

Page.	Line.	For	Read.
107	16	aud	and
108	8	Balke's	Blake's
113	12	9990000	9950000.
116	21	with water, as all the bottom.	with water as also the bottom.
Face 116	Diagram 2	Pipe from take off point F	Pipe should be from take off point E.
118	line 1	per minute of in gallons	per minute in gallons
119	3	line of levels are run	line of levels is run
119	18	and sunk into	or sunk into
120	9	discharges	discharging
121	6	wire guage board	weir guage board
121	16	this area will solve	this distance is of importance. A large scale plan of the area will solve
123	4	662/3 %	$66\frac{2}{3}$ %
123	12	Take off, site	Take off, and site
123	13	Point	Points
124	8	Burry	Bury
124	10	,,	"
124	last	supplies	supply
125	last	somethings	some things
126	2	esch	each
2nd para	2nd line	such as derived	such as that derived
133	6	same quantity	small quantity
137 para 2		This should be etc.	WORKING COST. This should be etc.

M. S. RAGHAVAN.